CLAIMS

What is claimed is:

1. A transimpedance amplifier circuit with an amplifier input, the transimpedance amplifier circuit having a controlled low cutoff frequency as average input current to the amplifier input increases, the transimpedance amplifier circuit comprising:

an optical device having an optical device input terminal and an optical device output terminal, the optical device for receiving an optical signal at the optical device input terminal, converting the optical signal to an input current, and providing the input current at the optical device output terminal;

a forward transimpedance circuit connected to the optical device output terminal, the forward transimpedance circuit for receiving the input current and generating an output signal based on the input current;

a feedback circuit that includes:

a first circuit that for detecting a low frequency component of the output signal; and

a second circuit that is driven by the low frequency component of the output signal and is connected to the forward transimpedance circuit such that the impedance of the second circuit presented at the amplifier input decreases as the output signal increases, the second circuit including:

a first pnp transistor having a first base terminal and a first emitter terminal, wherein the first emitter terminal is connected to the amplifier input; and

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a second pnp transistor having a second base terminal, the second base terminal being connected to the first base terminal, the second pnp transistor having an emitter size that is some factor smaller than an emitter size of the first pnp transistor.

2. A transimpedance amplifier circuit as recited in claim 1, wherein an impedance seen at the first emitter terminal is dependent on the average current of the input current and wherein the low cutoff frequency does not increase linearly as the input current increases.

3. A transimpedance amplifier circuit as recited in claim 1, wherein the second circuit has variable impedance such that increasing an optical overload of the transimpedance amplifier does not diminish an optical sensitivity of the transimpedance amplifier.

4. A transimpedance amplifier circuit as recited in claim 1, wherein the first circuit and the second circuit shunt a DC component of the input current such that a DC component of the output signal is significantly reduced.

5. A transimpedance amplifier circuit as recited in claim 1, wherein the first circuit includes a low frequency operational amplifier.

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6. A transimpedance amplifier with an amplifier input, the transimpedance amplifier having a controlled low cutoff frequency as average input to the transimpedance amplifier increases, the transimpedance amplifier comprising:

an input stage for receiving an input current signal provided at the output terminal of an optical device, the input stage generating an output voltage based on the received input current;

a gain stage for amplifying the output voltage to generate an amplified signal; and

a feedback circuit that includes:

a low frequency circuit for detecting a low frequency component of the amplified signal such that the low frequency component can be removed from the amplified signal; and

variable impedance circuitry, wherein an impedance of the variable impedance circuitry is dependent on an average current of the input current signal such that the impedance decreases as the average current increases and wherein a low cutoff frequency of the transimpedance amplifier decreases when the average current increases to greater than a specified threshold, the variable impedance circuitry including:

a first pnp transistor having a first base terminal and a first emitter terminal, wherein the emitter terminal is connected to the amplifier input, the first pnp transistor have a first emitter size; and

a second pnp transistor having a second base terminal, the second base terminal being connected to the first base terminal, the second pnp

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transistor having a second emitter size that is some factor smaller than the first emitter size.

7. A transimpedance amplifier as recited in claim 6, wherein the input stage is in a shunt feedback configuration and wherein the gain stage is an amplifier.

8. A transimpedance amplifier as recited in claim 6, wherein the low frequency circuit further comprises a low frequency operational amplifier.

9. A transimpedance amplifier as recited in claim 6, wherein the low frequency circuit detects and reduces the low frequency component at the input stage by shunting the low frequency component of the input current signal.

10. A transimpedance amplifier as recited in claim 6, wherein the first pnp transistor that has a transconductance that does not affect the low cutoff frequency of the transimpedance amplifier as the input current signal increases.

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11. In a system that receives input currents of different magnitudes, the system including a forward transimpedance circuit, a low frequency detection circuit, a variable impedance circuit, a first pnp transistor, and a second pnp transistor, the first pnp transistor having a first base terminal and a first emitter size, the second pnp transistor having a second base terminal, the second base terminal being connected to the first base terminal, the second pnp transistor having a second emitter size that is some factor smaller than the first emitter size, a method for controlling a low cutoff frequency as average input current to the system increases, the method comprising:

the forward transimpedance circuit receiving an input current from an optical device;

the forward transimpedance circuit generating an output signal based on the input current;

the low frequency detection circuit detecting a low frequency component of the output signal;

utilizing the low frequency component to determine the impedance of the variable impedance circuit such that the impedance of the of the variable impedance circuit decreases as the average input current increases;

utilizing the first and second pnp transistors to control the low cutoff frequency such that the low cutoff frequency transitions to decreasing when the magnitude of average input current reaches a specified threshold.

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